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NOTES ON NORTH AMERICAN SCUTELLARIAS.

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(Plates 140, 141.)

DR. ASA GRAY (Proc. Am. Acad. viii. 370), after remarking as to the placing of the genus *Scutellaria* in a subtribe, goes on to state that "The winged nutlets of *Perilomia*, however, are curiously imitated in one or two species of *Scutellaria*, only obscurely so in *S. parvula*, as has been noted by Dr. Torrey, . . . but strikingly in *S. nervosa*, Pursh, and in a Japanese species not otherwise very similar" The presence of this membranaceous wing, together with a reputed difference in shape of the corolla, is used as a basis of separation of the above-mentioned genus *Perilomia* from *Scutellaria* by Humboldt, Bonpland & Kunth (Nov. Gen. & Sp. Amer. ii. 326). Prof. Fernald (RHODORA, xxiii. 85), after examining sheets of the Old World *S. galericulata* and of the North American form, which for many years had passed as *S. galericulata*, came to the conclusion that the Old World plant is really not found as such on this side of the Atlantic, but that it has a closely related representative here. This was demonstrated chiefly by nutlet-characters, the exact significance of which will be clarified in the sequel.

These facts have combined to indicate that perhaps a critical inspection of the group in question, from the standpoint of the fruit, might serve to throw light on, if not to clear up, some well known taxonomic difficulties existing here. From an examination of over

two thousand sheets of herbarium material, it was found that the nutlet-characters indicated in a striking way the relationships of species and sections within the genus.

At this point it will be convenient to establish the generic and tribal relations of *Scutellaria*. In 1832-36, Bentham (*Labiatarum Genera et Species*) put *Scutellaria* and *Perilomia*—a South American genus—into a single tribe, but later, in 1848 (De Candolle's *Prodromus*), he added *Brunella* and *Cleonia* to these two and threw them into a sub-tribe *Scutellarieae* of the tribe *Stachydeae*. Briquet, in his treatment of the genus in Engler & Prantl's *Die Natürlichen Pflanzenfamilien*, assigns *Scutellaria* and *Salazaria* Torrey to the tribe *Scutellarioideae*, placing *Perilomia* in a separate tribe, *Stachyoideae*. It is noteworthy that in his grouping of the *Perilomia* entities he includes certain forms which other authors have put with *Scutellaria*, e. g., *S. Mociniana* Benth., and which apparently do not differ from that genus except by the alleged upright position of the seed. This special portion of the genus even has the scutellum on the calyx,—a character lacking in other sections. Undoubtedly the position of the seed is important in the classification, but its infallibility is questionable when it separates such apparently closely related forms. It is to be regretted that more material of these forms is not at hand. It is thought that the presence of the scutellum might serve as a more reliable generic character.

Scutellaria then, is characterized by its bilabiate calyx, with lips entire and closed in fruit. From the upper lip is a projection known as the scutellum. Its co-genus *Salazaria* is set off on account of its calyx which becomes swollen in fruit.

As somewhat detailed accounts of the genus, we have the earlier work of Arthur Hamilton, "Monographie du Genre Scutellaire," Bulletin Seringe, 1832, and Bentham's treatise in the work above mentioned. Both these earlier writers have seen fit to make a number of sections, separated according to the nature of the inflorescence, Bentham confessing on his part the inadequacy of these characters. Hamilton makes but three sections and includes in them fifty-two species, fourteen of which are assigned to North America. Bentham makes five sections into which sixty-three species are placed, fifteen of which are North American. Inasmuch as in the present investigation the fruit has been specially studied, and since the Old World specimens available were too infrequently fruiting for accurate observation and too scarce for authoritative judgment, it was thought

best to confine attention to North American material, exclusive of Mexico.

Interestingly enough, the sections earlier adopted in classification are, with a few exceptions, confirmed by the reproductive characters. Briquet, following the work of Gray, was evidently the first to expand on the more conservative, and therefore more reliable reproductive characters, to indicate taxonomically the natural relationships. The presence or absence of a membranaceous wing does not establish

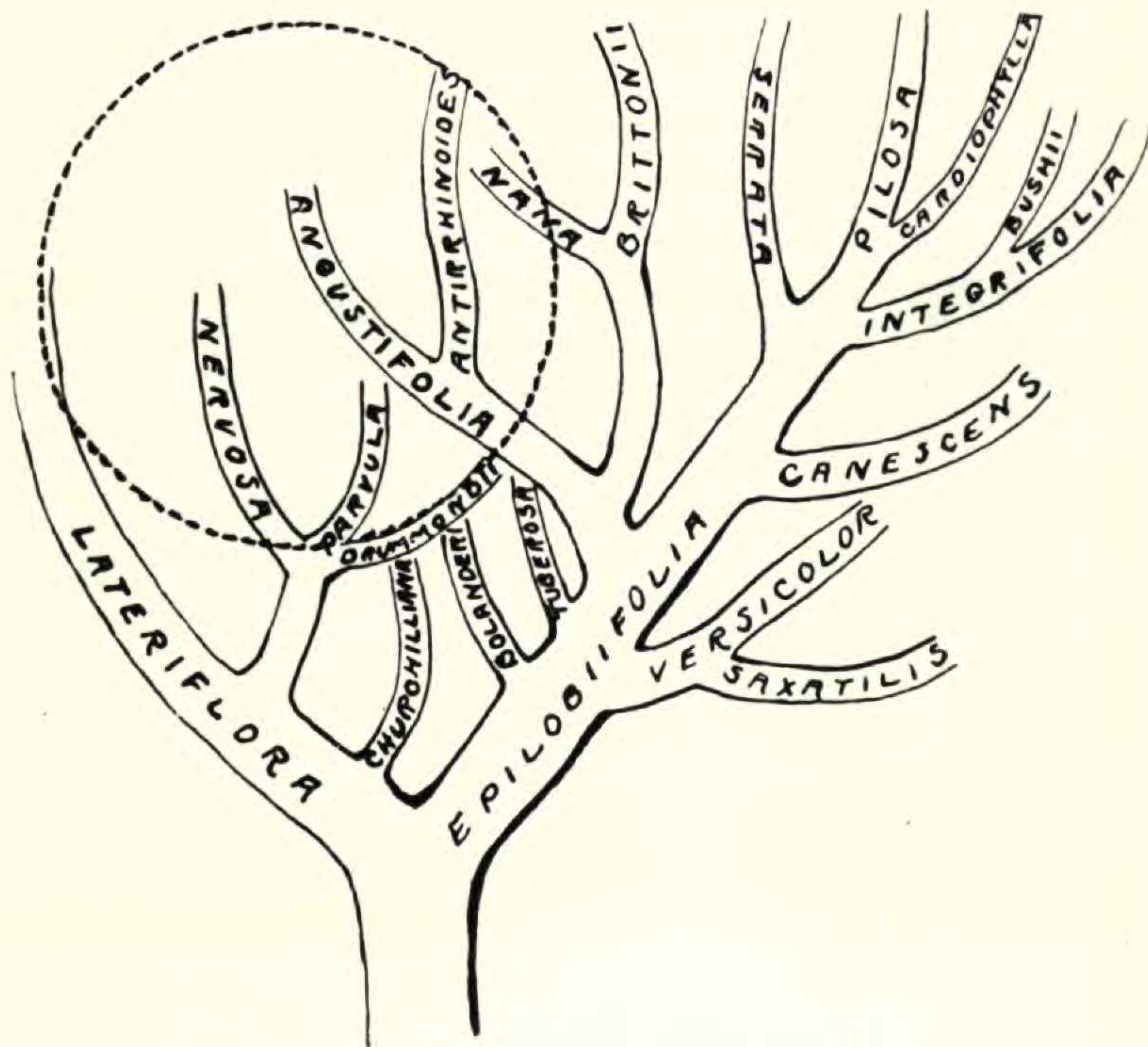


DIAGRAM 1. Showing relation of species of *Scutellaria*. (Forms with winged nutlets are in the circle.)

generic differences, as indicated by Bentham, for at least three well defined American species of the genus have this wing. It is also well to remark here that the two sheets referred to *Perilomia* (*P. ocymoides*) which are found in the Gray Herbarium do not have the winged achenia attributed to the genus. Apparently, therefore, we have double evidence as justification for the discard of this character as a generic distinction. However, the membranaceous wing is important within the genus *Scutellaria* and might afford a basis for the first division into component parts in an artificial key.

It is believed that even this nutlet-character is artificial, since it apparently has been secondarily acquired, appearing as it does in several different groups. It seems beyond a doubt, that *Scutellaria*

lateriflora and *S. epilobiifolia* are nearest the ancestral branch of the phylogenetic tree (diagram 1). Both are very wide-spread in distribution. According to the diagram, as I have conceived the situation, they represent the first forks of the tree, and both have given rise to groups showing the character in question. Further, in a hasty review of nutlet-characters of the other genera of the *Labiatae*, it appears that the character referred to is absent. This is another justification for believing it is of more recent development.

The first division was taken up by Gray, later adopted by Briquet and is now in use by authors of the larger manuals in this country. Briquet introduced names for these divisions or sections. The section *Scutellariopsis* should be extended to include at least two more North American species. Hitherto *Scutellaria nervosa* has been classed as our sole representative of this group. Yet it is difficult to understand why *S. parvula*, the achene of which has a conspicuous band, amazing in its constancy, should be left out. Here too we should place the *S. angustifolia* group, one species of which has nutlets with wings rivaling even those of *S. nervosa*.

The present status of the work and the limited area covered do not justify the grouping of the species of the genus into sections. It is hoped that later a survey of the world representatives may be made, at which time such sectional characters may be properly adjudged. It is hoped also, that a study of the immediately related genera may be taken up, following the more critical reproductive characters.

The arrangement of species given below follows a more or less natural system. As arranged, numbers 1, 2 and 3; 4 and 5; 6, 7, 8, 9, 10 and 11; 12, 13, and 14; and 15, 16, 17, 18, 19, 20 and 21, form fairly well defined groups. It will be seen that they do not agree with treatments given by other students of the group. The fact that militates against this kind of grouping, of course, is that it indicates an impossible linear evolution. True relationships are better shown in the tree (diagram 1).

There remains to say a word or two upon the acceptance of nutlet-characters as a basis for the separation of sections. This can best be brought out by means of an example: Perhaps one of the best-marked groups of species, the interrelations of which are shown by nutlet-characters, is the series consisting of *S. lateriflora*, *S. galericulata* and *S. epilobiifolia*. All three have canary-yellow achenes which are not duplicated elsewhere in the genus. Of these three *S. galericulata* (I am using this Old World species for purposes of illustra-

tion) comes between the others, both from a superficial standpoint and from the characters of the nutlets. *S. lateriflora* has small papillae or wart-like protuberances on the surface of the achene, while *S. epilobiifolia* has the surface of the achene merely scabridulous. The European *S. galericulata* has nutlets closely resembling those of *S. lateriflora*, while the vegetative characters are very similar to those of *S. epilobiifolia*. The corolla of the latter exceeds by about 1 cm. that of *S. galericulata*, which attains a length of no more than 1.5 cm. From this comparative examination, based on reproductive characters, it would seem anything but following the natural system to break off *S. lateriflora* and put it into a separate section as both Bentham and Briquet have done.

I desire to record my thanks to Prof. M. L. Fernald, who has supervised this work and given invaluable advice; to Dr. B. L. Robinson, Dr. J. M. Greenman, and Mr. Bayard Long, for the loan of herbarium material of their respective institutions; to Miss Mary A. Day and other members of the Gray Herbarium staff for help rendered along various lines during the execution of the work.

The key, based upon nutlet-characters, is artificial, since, as already explained, species which seem to have come through different lines of descent are thrown together. In the citation of specimens all which are not in the Gray Herbarium are indicated by initials in parentheses: N, Herbarium of New England Botanical Club; M, Missouri Botanical Garden; P, Academy of Natural Sciences of Philadelphia.

ANALYTIC KEY BASED ON NUTLET-CHARACTERS.¹

- A. Nutlets banded or winged, or conspicuously compressed dorso-ventrally B.
- B. Nutlets conspicuously winged C.
- C. Nutlets not over 1 mm. in diameter; wing more or less median D.
- D. Nutlets with muriculate papillae; wing relatively wide 7. *S. nervosa*.
- D. Nutlets with bluntish papillae; wing relatively narrow 6. *S. parvula*.
- C. Nutlets mostly over 1 mm. in diameter; wing somewhat basal, giving the nutlet a flattened appearance E.
- E. Nutlets with relatively narrow, unexpanded and non-membranaceous wings.....8. *S. angustifolia*.
- E. Nutlets with very wide, membranaceous wings. 9. *S. antirrhinoides*.
- B. Nutlets mostly merely compressed, never with conspicuous wings I.
- I. Nutlets dull yellow or grayish, with somewhat conical papillae.....11. *S. nana*.

¹ In the absence of mature nutlets some species have to be omitted from this key. Though in the succeeding descriptions they are placed in what appears to be their natural sequence.

- I. Nutlets dull black, with somewhat tuberculate, flattish papillae.....10. *S. Brittonii*.
- A. Nutlets not winged except rarely and in immature condition J.
- J. Nutlets merely rugose or finely granulate-papillate K.
- K. Nutlets canary yellow L.
- L. Nutlets merely scabridulous, *i. e.*, with inconspicuous papillae.....1. *S. epilobiifolia*.
- L. Nutlets with minute, wart-like papillae.....3. *S. lateriflora*.
- K. Nutlets black or brown, finely granulate-papillate....12. *S. resinosa*.
- J. Nutlets with conspicuous papillae M.
- M. Nutlets yellowish or orange.....4. *S. Bolanderi*.
- M. Nutlets brown or black N.
- N. Nutlets with conical, more or less sharp-pointed papillae O.
- O. Nutlets with very slender elongate papillae....21. *S. saxatilis*.
- O. Nutlets with the papillae short, broad at base, abruptly pointed.....20. *S. versicolor*.
(NOTE: *S. versicolor* frequently has the nutlets orange.)
- N. Nutlets with tuberos, flattened, obtuse papillae P.
- P. Nutlets strikingly rosulate in appearance....16. *S. integrifolia*.
- P. Nutlets not conspicuously rosulate Q.
- Q. Nutlets with thin, laminate papillae.....13. *S. Drummondii*.
- Q. Nutlets with thick papillae R.
- R. Nutlets with irregularly disposed muriculate papillae.....5. *S. tuberosa*.
- R. Nutlets with papillae regularly disposed S.
- S. Nutlets about 2 mm. in diameter.....19. *S. serrata*.
- S. Nutlets 1-1.5 mm. in diameter.....15. *S. pilosa*.
- J. Nutlets with short, truncate papillae T.
- T. Nutlets black.....14. *S. cardiophylla*.
- T. Nutlets brownish U.
- U. Nutlets with processes flat on top, frequently with median depression.....18. *S. canescens*.
- U. Nutlets with papillae rounded on top, smooth....17. *S. Bushii*.
(NOTE: *S. canescens* might be looked for here; the nutlets are light brown or olive-green in color.)

1. *S. EPILOBIIFOLIA* Hamilton. FIG. 6. Stem simple or branched, erect, 1.5-8 dm. high, smooth or somewhat pubescent: leaves ovate or oblong-lanceolate, acuminate, sessile or subsessile, serrate, frequently purplish underneath, 1.5-6 cm. long; the upper gradually diminishing into the bracts: flowers solitary in the axils of the upper leaves; corolla with pale tube and violet-blue lips and galea, rarely pink or white, 1.5-2.5 cm. long; lower lip somewhat protruding: achenes yellow, merely scabridulous or slightly pebbled, about 1.5 mm. in diameter.—Monog. 32 (1832). *S. galericulata* of American authors, not L.—Newfoundland to British Columbia and southward to Arizona. The following specimens are representative. NEWFOUNDLAND: *M. L. Fernald & K. M. Wiegand*, nos. 3930, 3929 and 6107; *B. L. Robinson & H. von Schrenk*, no. 103. QUEBEC: *H. St. John*, no. 90694; *J. Macoun*, no. 68667. NOVA SCOTIA: *C. D. Howe & W. F. Lang*, no. 529; *M. L. Fernald & B. Long*, no. 22363. NEW HAMPSHIRE: *C. C. Stewart*, no. 4403. MASSACHUSETTS: *J. M. Greenman*, no. 2079. NEW YORK: *O. P. Phelps*, no. 805. ONTARIO: *J. Macoun*, no. 20850. MICHIGAN: *J. H. Ehlers*, no. 125. INDIANA:

O. E. Lansing, no. 2829. MINNESOTA: *M. A. Barber*, no. 7. SOUTH DAKOTA: *P. A. Rydberg*, no. 948. NEBRASKA: *P. A. Rydberg*, no. 1490. ASSINIBOIA: *J. Macoun*, no. 5848. MONTANA: *F. L. Scribner*, no. 216. WYOMING: *A. Nelson & E. Nelson*, no. 6558. UTAH: *S. Watson*, no. 835. ARIZONA: *J. T. Rothrock*, no. 245. CALIFORNIA: *C. F. Sonne*, no. 287 (P). OREGON: *W. C. Cusick*, no. 1939a. BRITISH COLUMBIA: *S. Brown*, no. 748.

Forma ROSEA (Rand & Redfield) Fernald, RHODORA xxiii. 86 (1921). *S. galericulata*, forma *rosea* Rand & Redfield, Fl. Mt. Desert, 137 (1894).

Forma ALBIFLORA (Millsp.) Fernald, l. c. (1921). *S. galericulata*, forma *albiflora* Millsp. Fl. W. Va. 428 (1892).

2. *S. CHURCHILLIANA* Fernald. A form intermediate between *S. lateriflora* and *S. epilobiifolia* and possibly a hybrid of these two: stems erect, branching, flexuous, the angles covered with minute ascending pubescence: flowers borne singly in the axils of the upper leaves or in axillary racemes, similar to those of *S. lateriflora*: corolla violet-blue, 1–1.5 cm. long: leaves thin, ovate, acuminate, short-petioled.—RHODORA iv. 137 (1902).—Gravelly river-thickets of Maine and adjacent New Brunswick. The following specimens are characteristic. MAINE: *M. L. Fernald & B. Long*, nos. 14455 (P), 14452, 14454 and 260; *M. L. Fernald*, no. 2088; *W. W. Eggleston & M. L. Fernald*, Valley of St. Francis River, August 12, 1902; *M. L. Fernald*, Valley of Aroostook River, September 8, 1897; *K. K. MacKenzie*, no. 3590 (M); *O. W. Knight*, Veazie, August 6, 1905, and no. 100; *J. A. Cushman*, no. 2134 (N); *J. R. Churchill*, Fort Kent, July 19, 1908 (N); *Kate Furbish*, East Livermore, July & August 1896 (N), South Poland, 1893 (N), Great Diamond Island, 1888 (N), Great Chebeague Island, June 11, 1902. NEW BRUNSWICK: *M. L. Fernald & B. Long*, no. 14453.

3. *S. LATERIFLORA* L. FIG. 7. Erect, mostly branched, 2–6 dm. high, smooth: leaves thin, oblong-lanceolate, acuminate, serrate, rounded at the base, petioled, 3–9 cm. long: inflorescence in axillary, rarely terminal, racemes: corolla bluish to whitish, 5–8 mm. long; lips equal in length: achenes yellow, with minute papillae on the surface.—Sp. Pl. ii. 598 (1753).—River-thickets or wet shaded places, from Newfoundland to British Columbia and southward to Florida and New Mexico. The following are representative. NEWFOUNDLAND: *M. L. Fernald & K. M. Wiegand*, no. 6102. QUEBEC: *S. F. Blake*, no. 5619; *M. L. Fernald & H. B. Jackson*, no. 12152. PRINCE EDWARD ISLAND: *M. L. Fernald, B. Long & H. St. John*, no. 7960. NOVA SCOTIA: *H. St. John*, no. 1443. MASSACHUSETTS: *B. L. Robinson*, no. 588. NEW JERSEY: *Gershoy*, no. 589. PENNSYLVANIA: *A. A. Heller & E. G. Heller*, no. 653. WEST VIRGINIA: *J. M. Greenman*, no. 480. ONTARIO: *J. Macoun*, no. 21859. OHIO: *J. M. Greenman*, no. 1399. ILLINOIS: *Chase* (P), no. 514177. MISSISSIPPI: *S. M. Tracy*, no. 8752. MISSOURI: *E. J. Palmer*, no. 2651. NEBRASKA: *F. Clements*, no. 2781. NEW MEXICO: *C. Wright*, no. 1538.

OREGON: *J. C. Nelson*, no. 1832. WASHINGTON: *W. N. Suksdorf*, no. 1001. BRITISH COLUMBIA: *J. Macoun*, no. 54677.

Forma RHODANTHA Fernald, RHODORA xxiii. 86 (1921). A form with pinkish flowers, found in Quebec.

Forma ALBIFLORA (Farwell) Fernald, RHODORA xxiii. 86 (1921). *S. lateriflora* var. *albiflora* Farwell, Mich. Acad. Sci. Ann. Rep. xix. 249 (1917). A form with white flowers.

4. *S. BOLANDERI* Gray. Erect, tall and very slender, virgulate or branched from below, 1.5–5.5 dm. high, leafy, pubescent or short-hairy: leaves broadly obovate, obtuse, sessile, crenate, or the upper nearly entire; corolla nearly as in *S. antirrhinoides*, but white or creamy in color and dilated at the throat, 10–15 mm. long; lips subequal: nutlets yellowish, with slender papillae.—Proc. Am. Acad. vii. 387 (1867).—River-bottoms, etc., in California from Plumas County southward.¹ The following are characteristic. *H. M. Hall*, no. 696 (M); *G. Hansen*, no. 448 (M); *C. R. Orcutt*, no. 429 (M); *A. Eastwood*, no. 4199.

Var. **californica** (Gray), n. comb. Differs from the above in being very finely puberulent, somewhat more rigid; all but sometimes the lowest pairs of leaves entire, petioled; the corolla mostly white, sometimes tinged with blue, 15–18 mm. long.—*S. californica* Gray, Syn. Fl. ii. 381 (1878). Including *S. viarum* Heller, Muhlenbergia, i. 32 (1904).—In CALIFORNIA from Amador County northward to Tehama County. The following represent the variety. *J. D. Hooker & A. Gray*, Calaveras County, 1877; *A. A. Heller*, nos. 5786, 7020, 12379; *E. Braunton*, no. 1047 (M); *T. Bridges*, no. 304; *J. Torrey*, no. 406; *C. F. Sonne*, no. 286 (M); *A. Eastwood*, no. 1530; *M. E. Jones*, no. 13485 (M); *J. P. Tracy*, no. 2297.

This variety includes a number of forms intermediate between *S. Bolanderi* and *S. antirrhinoides*. In fact it might well be regarded as a hybrid of these two. In the main it has more of the characters of the former than of the latter and hence is referred here rather than to *S. antirrhinoides* as at first done by Gray. Fruiting material is too poorly represented for good comparison.

5. *S. TUBEROSA* Benth. FIG. 12. Mostly simple and erect, frequently with many leafy stems from a common base, or even decumbent, villous to nearly glabrous, 2.5–15 cm. high, or, when trailing, up to 3.5 dm. long: leaves villous or nearly glabrous, petioled, broadly ovate, with few coarse crenations; base rounded, truncate or sometimes cuneate: flowers short-pedicelled, solitary in the upper axils: corolla dark-blue or purple, rarely curved, 1–2 cm. long; the lips subequal: calyx villous: nutlets with projections somewhat muriculate, dark-brown when fully mature.—Lab. Gen. et Sp. 441 (1832–1836).—Foothills or valleys throughout California and southern Oregon. The following specimens are representative. CALIFORNIA: *W. H.*

¹ One sheet is from Indian Valley, Plumas County, *J. G. Lemmon*, autumn, 1886; the rest from Amador Co. southward.

Brewer, no. 357; *C. C. Parry*, no. 338; *W. W. Jones*, no. 285; *J. G. Lemmon*, no. 338; *A. A. Heller*, no. 7288; *C. R. Orcutt*, no. 1343 (M). OREGON: *H. S. Prescott*, Grants Pass, April 5, 1912; *T. Howell*, no. 1252 (M); *E. W. Hammond*, no. 329 (M).

6. *S. PARVULA* Michx. FIG. 2. Erect, simple or branching, 1–3.5 dm. high, usually many-stemmed from a moniliform tuberiferous base, pubescent nearly throughout: leaves thin, greenish, oblong-ovate, much broader at the base, 0.8 to 2 cm. long, prominently nerved beneath; the upper sessile; the lower short-petioled, occasionally with few coarse teeth: flowers solitary in the upper axils: corolla 0.7–1 cm. long, blue; the lower lip longer and flaring: calyx with upper lip commonly purple: nutlets papillose with tubercles, banded, showing close relation with *S. nervosa*.—Fl. ii. 11 (1803). *S. campestris* Britton, Mem. Torr. Club, v. 283 (1894). *S. parvula*, var. *mollis* Gray, Syn. Fl. ii. 380 (1878), in part.—On richer soils of the Great Lake region and the Mississippi valley, Quebec and Ontario southward to Georgia and Texas. The following are characteristic. QUEBEC: *W. F. Macrae*, "in river St. Lawrence opposite Montreal" (M); *A. S. Pease*, no. 12940; *Mrs. Shepard*. ONTARIO: *J. Macoun*, Pelee Point, Lake Erie, August 6, 1901. MICHIGAN: ex. Herb. *E. F. Smith*, Ionia, 1877. VERMONT: *L. R. Jones & W. W. Eggleston*, Burlington, July 12, 1894. NEW YORK: *A. Wood*, Dexter. OHIO: *E. L. Moseley*, Marblehead, May 25, 1895. ILLINOIS: *H. M. Smith*, no. 5924; *A. S. Pease*, no. 12555; *J. M. Greenman*, no. 2614 (M). TENNESSEE: *E. J. Palmer*, no. 17333 (M); *S. M. Bain*, no. 38. VIRGINIA: *J. Q. A. Fritchey*, Richmond, August 28, 1888. GEORGIA: *T. J. Wray*, Augusta (P); *S. Boykin* (P). MISSOURI: *O. E. Lansing*, no. 3033; *J. Davis*, no. 3434 (M); *E. J. Palmer*, no. 5632 (M). TEXAS: *E. J. Palmer*, no. 5034 (M); *J. Reverchon*, no. 3245 (M). LOUISIANA: *E. J. Palmer*, no. 7217 (M). OKLAHOMA: *E. J. Palmer*, no. 5956 (M); *H. W. Houghton*, no. 3582½. ARKANSAS: *B. F. Bush*, no. 1435 (M).

Var. *AMBIGUA* (Nutt.) Fernald. Similar to above but slightly more rigid in aspect; stem and under surface of leaves usually purplish, glabrous or with very slight appressed puberulence; the upper surface of the leaves sometimes with spreading hairs; the leaves narrower and rarely toothed.—RHODORA iii. 201 (1901). *S. ambigua* Nutt. Gen. ii. 37 (1818). *S. parvula*, authors.—In drier habitats, Maine to Minnesota and southward to Texas and westward to Nebraska. The following are characteristic. MAINE: *M. L. Fernald*, no. 466; *J. C. Parlin*, no. 305. CONNECTICUT: *G. Thurber*, East Haven, 1855; *E. B. Harger*, no. 6411 (P). PENNSYLVANIA: *W. F. Detwiller*, Mercersburg, May 19, 1845 (P); *S. D. Ingram*, Harrisburg (P). NEW JERSEY: *P. Dowell*, no. 6027. DELAWARE: *W. M. Canby*, Rehoboth, July, 1878 (P). INDIANA: *A. H. Young*, Lafayette, June, 1879 (P). TENNESSEE: *A. Ruth*, Knoxville, June, 1897 (P). ILLINOIS: *S. B. Mead*, Augusta, 1845 (P); *H. N. Patterson*, Oquawka, August, 1873; *H. A. Gleason*, Rantoul, July 5, 1907. MISSOURI: *B. F. Bush* no. 336; *O. E. Lansing*, no. 2977. LOUISIANA: *J. Hale*, Alexandria

(P). TEXAS: *E. Hall*, no. 453 (M). OKLAHOMA: *G. W. Stevens*, no. 2235. IOWA: *R. Coombs & C. R. Ball*, no. 569 (M). KANSAS: *J. B. Norton*, no. 411 (M). NEBRASKA: *H. J. Weber*, Lincoln, June, 1890 (M). SOUTH DAKOTA: *H. O. Powell*, White Rock, June, 1902. MINNESOTA: *E. P. Sheldon*, Princeton, July, 1892.

7. *S. NERVOSA* Pursh. FIG. 1. Very slender, mostly simple, but frequently branched, 1.5 dm. high: internodes separating widely the opposite pairs or leaves: leaves ovate or oblanceolate, toothed, smooth, but occasionally sparsely strigose on the upper surface, 2–4.5 cm. long; the lower short-petioled; the upper sessile: flowers solitary in the axils of the entire upper leaves: corolla bluish, about 1 cm. long; the lower lip protruding beyond the upper: nutlets winged, yellowish or buff, with muriculate papillae.—Fl. ii. 412 (1814). *S. gracilis* Nutt. Gen. ii. 37 (1818).—Pennsylvania to Virginia, westward and southward to Missouri and Alabama. The following specimens are representative. PENNSYLVANIA: *E. B. Bartram*, Homewood near Pillsbury, June 15, 1907 (P); *S. Brown*, Quakertown, June 3, 1894 (P); *A. A. Heller*, Lancaster, May 28, 1889. NEW JERSEY: *J. Torrey*. DELAWARE: *W. M. Canby*, June 12, 1897 (P). MARYLAND: *E. B. Bartram*, Conowingo, May 30, 1907 (P). VIRGINIA: *C. S. Williamson*, Great Falls of Potomac, May 28, 1909 (P). WEST VIRGINIA: *W. M. Pollock*, May 30, 1896. KENTUCKY: *S. F. Price*, Bowling Green, May 12, 1900 (M); *E. J. Palmer*, no. 17803 (M). TENNESSEE: *E. J. Palmer*, no. 17601 (M); *A. Ruth*, Knox Co., May, 1893 (M). ALABAMA: *H. Eggert*, Etowah Co., June 30, 1897 (M). MISSOURI: *B. F. Bush*, Dunklin Co., May 22, 1892 (M); *H. Eggert*, St. Louis Co., June 5, 1877 (M); *S. B. Mead*, May 30, 1848 (M); *E. J. Palmer*, no. 15585; *E. Hall*, no. 11397 (M). INDIANA: *A. H. Young*, Hanover, August, 1881 (P). OHIO: *W. S. Sullivant*, 1840 (P); *E. L. Moseley*, Florence, August 7, 1897.

Forma **ternata**, n. f., foliis ternatis.—One sheet collected by *C. W. Short* at Lexington, KENTUCKY, 1835 (P).

8. *S. ANGUSTIFOLIA* Pursh. FIG. 3. Erect, stems many from the base, or branched above, or frequently solitary, 1–2 dm. high, minutely pubescent or almost glabrous, from a moniliform tuberiferous or somewhat fibrous base, purplish below: leaves linear to oblong-ovate, obtuse, practically sessile, commonly conduplicate, entire, 1–3 cm. long, except the lower; these when present, petioled, few-toothed, cordate, small, commonly purplish below: flowers in the upper axils, on pedicels 5–8 mm. long: corolla curved at the slender base, commonly 2–2.5 cm. long but reaching 3 cm., not broadening until 5–10 mm. above the calyx: lips subequal or the lower slightly longer, various as to color, deep blue to purple: nutlets large, with slender papillae and faintly banded at the base.—Fl. ii. 412 (1814). Including *S. Austineae* Eastw., Bull. Torr. Bot. Club, xxx. 493 (1903) and *S. linearifolia* Eastw., l. c. 493 (1903).—Stream-bars or on rocky hillsides from British Columbia and Idaho to southern California. The following are representative. IDAHO: *W. Trelease*, no. 4883

(M); *A. A. & E. G. Heller*, no. 3150 (P); *J. H. Sandberg*, no. 8689 (M); *J. B. Leiberger*, no. 1548; *J. F. Macbride*, no. 104. BRITISH COLUMBIA: *J. M. Macoun*, no. 67887. WASHINGTON: *F. O. Kreager*, no. 10; *C. V. Piper*, nos. 1570, 1571; *A. D. E. Elmer*, no. 900; *R. M. Horner*, no. R178B411. OREGON: *E. W. Hammond*, no. 330 (M); *W. C. Cusick*, nos. 75, 2145; *M. Spalding*, April 28; *E. P. Sheldon*, no. 8007. CALIFORNIA: *Culbertson*, no. 4446; *C. C. Parry & J. G. Lemmon*, no. 337; *A. Gray*, Chico (field), February to May, 1885; *C. A. Purpus*, no. 5605 (M); *S. B. Parish*, no. 3122 (M); *L. Abrams*, no. 2778; *H. M. Hall & H. P. Chandler*, no. 242; *A. A. Heller*, no. 7889; *A. Eastwood*, no. 1015.

Var. **canescens** Gray. In many respects similar to the above, mostly simple, virgulate, canescent; leaves linear-oblong, 2–4.5 cm. long, nearly tomentose, firm, not conduplicate, ascending sharply; corolla slender and gracefully curved.—*Bot. Calif.* i. 603 (1876). *S. siphocampyloides* Vatke, *Bot. Zeit.* xxx. 717 (1872).—In CALIFORNIA from Sierra County southward on foot-hills and mountains. The following are representative. *H. N. Bolander*, nos. 4946 (M), 3947; *W. R. Dudley*, no. 4131; *A. D. E. Elmer*, no. 4434 (M); *W. H. Brewer*, no. 1285.

9. *S. ANTIRRHINOIDES* Benth. FIG. 4. Mostly erect, somewhat spindling, simple or branched, from a chiefly fibrous base, 1–3.5 dm. high, minutely pubescent: leaves ovate-oblong, obtuse, mostly short-petioled, never over 2.5 cm. long; all but the very lowest entire: flowers in the upper axils, on pedicels 5–10 mm. long, commonly 1–1.5 cm., never over 2 cm. long; the corolla-tube flaring from immediately above the calyx; the lower lip usually longer, deep blue to violet in color: nutlets with slender papillae, frequently strikingly winged, suggesting those of *S. parvula* and *S. nervosa*.—*Bot. Reg.* viii. 1493 (1822). *S. sanhedrensis* Heller, *Muhlenbergia*, i. 31, (1904). *S. nevadensis* Eastwood, *Bull. Torr. Bot. Club*, xxx. 492 (1903).—Rocky banks and slopes, Idaho and Utah to California and Oregon. The following are characteristic. IDAHO: *J. F. Macbride*, nos. 937 (M), 482 (M); *A. Nelson & J. F. Macbride*, no. 1208. UTAH: *L. H. Pammel & R. E. Blackwood*, no. 3778. NEVADA: *A. A. Heller*, no. 11120; *M. E. Jones*, no. 4036; *A. Nelson & J. F. Macbride*, no. 1927. CALIFORNIA: *A. A. Heller & P. B. Kennedy*, nos. 8798, 8843 (M); *J. P. Tracy*, no. 3399; *L. E. Smith*, no. 316; *A. A. Heller*, nos. 5894, 12111. OREGON: *E. Hall*, no. 398; *J. C. Nelson*, no. 2668; *T. Howell*, no. 1253 (M).

10. *S. BRITTONII* Porter. Erect, simple or branched, minutely pubescent or puberulent, usually 1–2 dm. high: underground stems frequently with moniliform tubers: leaves obovate, acuminate at each end or obtuse at tip, somewhat viscid, sometimes purplish beneath, 1.5–3 cm. long, hardly petioled; margins subrevolute; nerves prominent dorsally: corolla slender at base, gradually dilated to ampliate throat and lips, blue, 2–3 cm. long: nutlets dull black, mostly angled with tuberculate processes.—*Bull. Torr. Bot. Club*, xxi.

177 (1894). *S. resinosa* of Gray, not Torrey.—On foot-hills or plains in northern Colorado and southern Wyoming. The following specimens are representative. COLORADO: *G. E. Osterhout*, no. 2587 (P); *H. N. Patterson*, no. 296; *C. C. Parry*, no. 85 (P); *T. S. Brandegee*, no. B 413 (P); *E. B. Payson*, Eldora, July 7, 1919. WYOMING: *A. Nelson*, nos. 94 and 7009.

11. *S. NANA* Gray. FIG. 5. Small, usually 4–6 cm. high, cinereous-puberulent, several branches from the base: rootstocks yellow, with moniliform tubers or simply tuberiferous: leaves entire, ovate to obovate, with long attenuate base, or sometimes spatulate, 1–2 cm. long; nerves usually conspicuous on the lower surface of the leaf: corolla white, the lips equal: nutlets dull yellow with conical protuberances, sometimes angled or compressed.—*Proc. Am. Acad.* xi. 100 (1876). *S. Footeana* A. I. Mulford, *Bot. Gaz.* xix. 118 (1894).—Dry sandy hillsides in northwestern Nevada, northern California, southern Oregon, and southwestern Nevada. The following are representative. CALIFORNIA: *L. E. Smith*, no. 390; *A. A. Heller*, no. 8086; *H. E. Brown*, no. 613; *E. Palmer*, no. 2602 (P). NEVADA: *J. G. Lemmon*, no. 538; *M. E. Jones*, Wadsworth, June 16, 1897 (M); *P. B. Kennedy*, no. 1028 (M). OREGON: *M. E. Peck*, no. 6747; *J. B. Leiberger*, no. 472; *W. C. Cusick*, no. 1980. IDAHO: *A. I. Mulford*, Black Cañon, June 18, 1802.

12. *S. RESINOSA* Torr. FIG. 8. Stems erect, few to many, from a woody base, 1–3 dm. high, puberulent: leaves ovate, entire, or the lower subcrenulate, attenuate at the base, slightly petioled or sessile, minutely pubescent, resiniferous, 1–2 cm. long; nerves prominent on the upper surface of the leaves: corolla bluish to violet, 12–20 mm. long; upper lip forming an arch with the tube; lower lip occasionally lightly blotched, equal to or exceeding the upper: nutlets about 1 mm. in diameter, black, minutely granular.—*Ann. Lyc. N. Y.* ii. 232 (1826). *S. Wrightii* Gray, *Proc. Am. Acad.* viii. 370 (1872).—Kansas to Texas and westward to Arizona, on dry grassy slopes or prairies. The following sheets are representative. KANSAS: *J. M. Bates*, no. 4552; *C. L. Shear*, no. 72; *A. S. Hitchcock*, no. 410; *E. Bartholomew*, June 6, 1889 (M). OKLAHOMA: *R. L. Clifton*, no. 3025; *G. W. Stevens*, no. 1291; *P. J. White*, no. 28 (M); *W. H. Emig*, no. 776 (M). TEXAS: *E. Hall*, no. 457; *E. Palmer*, no. 1086-7; *A. A. Heller*, no. 1606; *F. Lindheimer*, no. 674; *E. J. Palmer*, nos. 14117 (M) 11563 (M), 13738 (M), 10229 (M). NEW MEXICO: *G. Thurber*, no. 286; *C. Wright*, no. 1540; *O. B. Metcalfe*, no. 934; *A. Gordon*, no. 67 (M). ARIZONA: *L. N. Goodding*, nos. 848, 224 (M); *J. G. Lemmon*, no. 2860; *D. Griffiths*, no. 4809; *C. G. Pringle*, no. 15956.

Var. **brevifolia** (Gray), n. comb. Stems from a ligneous base, mostly over 2 dm. high, cinereous-puberulent: leaves narrowly oblong, entire: corolla 20–25 mm. long, flaring at the top.—*S. integrifolia*, var. *brevifolia* Gray in *E. Hall*, *Pl. Tex.* no. 458 (1873), name only. *S. brevifolia* Gray, *Syn. Fl.* ii. 380 (1878).—Northeastern Texas, on dry calcareous hills or rocky bluffs. The following specimens

represent the range and habit of the variety. *E. Hall*, no. 458 (P); *J. Reverchon*, nos. 440, 2059, 771 (M) and 2126 (M); *G. W. Letterman*, Texarkana, October 15–24, 1894, and Dallas, August, 1882.

This form was first given recognition by Dr. Gray as a variety of *S. integrifolia*, but was later raised to specific rank. It is, however, merely a variety of *S. resinosa*. An inspection of the range of *S. integrifolia* shows that it has no representative in Texas except var. *hispida*. Finally, the nutlet of *S. brevifolia* is an exact duplicate of that of *S. resinosa*. Although with leaves somewhat longer than those of the ordinary *S. resinosa* (about 1 cm.) a quirk in the nomenclatorial rules gives to this plant the somewhat paradoxical name of *S. resinosa*, var. *brevifolia*. Originally connected with *S. integrifolia*, the application of the name was apparent.

13. *S. DRUMMONDII* Benth. FIG. 11. Stems many, erect, branching at the base, villous-pubescent, mostly 1–2.5 dm. high: leaves slightly petioled or sessile, oblong-ovate or oval, entire, 1–2 cm. long, or commonly less, undulate-crenate: calyx villous, frequently tinged with purple: corolla short, 8–12 mm. long, bluish purple or violet; the lower lip exceeding the upper, flaring, notched, violet-spotted: nutlets yellowish to dark brown, or blackish with age, with conical or frequently laminate processes.—*Lab. Gen. et Sp.* 441 (1832–1836).—*S. Helleri* Small, Fl. So. U. S. 1024 (1903).—Mostly on rich plains or in open woods throughout Texas, in adjacent Oklahoma and New Mexico, and running into Mexico. The following sheets are representative. NEW MEXICO: *C. Wright*, nos. 1539 and 1540. OKLAHOMA: *G. W. Stevens*, nos. 695 and 1078. TEXAS: *S. M. Tracy*, no. 7994; *G. Thurber*, San Antonio, April, 1853; *F. Lindheimer*, nos. 1095 and 143; *E. Hall*, no. 456; *B. F. Bush*, no. 627; *E. J. Palmer*, nos. 9685 (M) and 13482 (M); *G. Jermy*, no. 101 (M); *W. M. Canby*, no. 201 (M); *J. Reverchon*, no. 2065 (P); *H. A. Pilsbry*, New Braunfels, April 17–19, 1903 (P); *A. A. Heller*, no. 1503 (P); *H. C. Hansen*, no. 542 (M).

Somewhat variable in the size of respective parts, this species is yet constant enough not to warrant any breaking up into subdivisions. The shape of the corolla is especially constant. The nutlets serve to indicate a connection with the *S. nervosa*–*S. parvula* group.

14. *S. CARDIOPHYLLA* Engelm. & Gray. Stems slender, upright, branching, 3–6 dm. tall, puberulent, often purplish-tinted on the lower part: leaves petioled, deltoid or subcordate, mostly obtuse, crenate, 1.5–4 cm. long: inflorescence loose, leafy-bracted: corolla slender, 12–17 mm. long, blue: crest of calyx commonly purple: nutlets black, tuberculate with truncate processes, never merely granular as in *S. resinosa*.—*Pl. Lindh.* i. 19 (1845).—Arkansas and Texas, on gravelly hillsides or sandy woods. The following sheets

are representative. ARKANSAS: *F. L. Harvey*, no. 114; *E. J. Palmer*, no. 10503 (M); *G. W. Letterman*, Hot Springs, August 4, 1879 (M), and July or August, 188- (M). TEXAS: *J. Reverchon*, no. 3910; *R. A. Dixon*, no. 339; *F. Lindheimer*, no. 144; *E. Hall*, no. 454; *E. J. Palmer*, no. 7887 (M); *H. Eggert*, Palestine, June 10, 1899.

A distinct species with achenes that show closer relation to *S. pilosa* than to any other *Scutellaria*. The leaves also suggest a relation. It is interesting to note that toward the west *S. pilosa* runs out in Arkansas, though no intermediate forms between these two are found.

15. *S. PILOSA* Michx. Stem erect, mostly slender and simple, the inflorescence sometimes branched, finely pubescent or hirsute, 2-7 dm. high; internodes frequently 10 cm. long: leaves petioled, crenate; the lower ovate or oblong-ovate, obtuse, abrupt or even truncate at the base, 2-8 cm. long; the upper subsessile and somewhat oblong-spathulate: corolla slender, bluish, 1-1.5 cm. long; lips subequal; the upper arched: calyx villous: nutlets with protuberances as in *S. serrata* (fig. 13) but smaller (1-1.5 mm. in diam.).—Fl. Bor.-Am. ii. 11 (1803). ? *S. caroliniana* Walt. Fl. Car. 163 (1788). Including var. β Benth. (*S. ovalifolia* Pers. Syn. ii. 136 (1807)) and *S. altamaha* Small, Fl. So. U. S., 1022 (1903).—River-banks or woodlands, New York to Michigan and southward to Georgia and Texas. The following are characteristic: NEW YORK: *J. Schenk*, Long Island, June 28, 1878 (M). PENNSYLVANIA: *T. C. Porter*, Easton, July 10, 1868 (P); *B. Long*, Lancaster, June 22, 1909 (P). NEW JERSEY: *C. W. Short*, Princeton, July 11, 1850 (P); *B. Long*, no. 5641 (P). DISTRICT OF COLUMBIA: Washington, *E. S. Steele*, June 15, 1896. VIRGINIA: *A. H. Curtiss*, Bedford County, June 15, 1871; *H. D. House*, no. 1046. WEST VIRGINIA: *J. M. Greenman*, no. 478 (M). NORTH CAROLINA: *J. R. Churchill*, Hot Springs, June 1, 1899; *A. A. Heller*, Hickory, June 23, 1893 (P). SOUTH CAROLINA: *W. Stone*, no. 546 (P); *Rev. J. Backman*, Charleston. GEORGIA: *A. H. Curtiss*, no. 6826 (M); *R. M. Harper*, no. 1358. ALABAMA: *C. Mohr*, Mobile, May, 1884 (M); *F. S. Earle & C. F. Baker*, Auburn, June 5, 1897 (M). MISSISSIPPI: *J. Skehan*, no. 77; *S. M. Tracy*, no. 4451. LOUISIANA: *J. Hale*, Alexandria (P); *C. R. Ball*, no. 656 (M). TEXAS: *C. Wright*. OKLAHOMA: *G. W. Stevens*, no. 2732. ARKANSAS: *N. M. Glatfelter*, Eureka Springs, July 17, 1898 (M). MISSOURI: *E. J. Palmer*, no. 5802 (M); *B. F. Bush*, no. 667 (M). TENNESSEE: *H. Eggert*, Sherwood, June 6, 1897 (M); *T. H. Kearney*, no. 871 (M). KENTUCKY: *C. W. Short*, Lexington (P). INDIANA: *C. C. Deam*, no. 20417. MICHIGAN: (M) no. 109374. ILLINOIS: *E. J. Palmer*, no. 15399.

Var. *HIRSUTA* (Short) Gray. Like the preceding but taller and with leaves having coarser crenations, and longer pubescence.—Syn. Fl. ii. 379 (1878). *S. hirsuta* Short, Cat. Pl. Ken. 8 (1835).—Not a very marked variety; found only in northern KENTUCKY. We have examined the following sheets, all collected by *C. W. Short*: Louis-

ville, September, 1835 (P), 2 sheets; 1842, 2 sheets; 1842, no. 109393 (M); 1846, no. 109395 (M); 1848, nos. 109394 (M), 109396 (M), and 109397 (M).

16. *S. INTEGRIFOLIA* L. FIG. 10. Erect, simple or branched at the top, 2–7 dm. tall, covered with fine puberulence: the upper leaves linear-oblong, gradually narrowed (when present) to the short petiole, 1.5–6 cm. long; the lower strongly petioled, ovate or cordate, obtuse, crenate, sometimes deciduous, leaving the stem with only entire leaves: corolla 18–24 mm. long, bluish or purple; the lower lip very ampliate; the upper broad and arching: nutlets with flattish papillae giving it a rosulate appearance.—Sp. Pl. ii. 599 (1753). *S. hyssopifolia* L. Sp. Pl. ii. 599 (1753). *S. polymorpha* Hamilt. Monog. 38 (1832).—Low moist ground from Massachusetts south to Florida and Mississippi. The following are representative. PENNSYLVANIA: *E. B. Bartram*, no. 1078; *F. W. Pennell*, no. 69 (P); *H. W. Pretz*, no. 7559 (P). NEW JERSEY: *B. Long & S. Brown*, no. 17 (P); *W. Stone*, Medford, July 4, 1910 (P). DELAWARE: *E. Tatnall*, Wilmington, 1886, Porter, June 6, 1874. MARYLAND: *W. R. Maxon*, no. 5918. VIRGINIA: *A. A. Heller*, no. 930; *B. L. Robinson*, Buckroe, May 21, 1912. NORTH CAROLINA: *T. G. Harbison*, Waynesville, July 1, 1897; *Biltmore Herbarium*, no. 954. SOUTH CAROLINA: *J. Perkins*, Summerville, April 29–May 10, 1918; *J. Davis*, no. 8381 (M). GEORGIA: *H. Eggert*, Belair, May 22, 1899 (M). FLORIDA: *S. M. Tracy*, no. 9162; *A. A. Eaton*, no. 1410. ALABAMA: *A. Ruth*, no. 540 (M); *C. Mohr*, Mobile, May, 1891 (M). KENTUCKY: *C. W. Short*, Flats of Red River (P). TENNESSEE: *A. Ruth*, no. 120; *H. Eggert*, Tullahoma, June 9, 1897 (M). MISSISSIPPI: *J. Skehan*, no. 63.

Var. MAJOR Chapm. More rigid in habit, rather heavily pubescent, 2–8 dm. high; with several pairs of dentate, petioled basal leaves, these larger than the bracts.—Fl. So. U. S. 323 (1860). Incl. *S. arenicola* Small, Bull. Torr. Bot. Club, xxv. 143 (1898).—Low sandy locations, Georgia and Florida to Mississippi. The following specimens are characteristic. FLORIDA: *A. H. Curtiss*, nos. 2060 and 2058; *G. V. Nash*, no. 1316; *A. A. Eaton*, no. 1153; *H. J. Weber*, no. 514 (M). MISSISSIPPI: *S. M. Tracy*, no. 4453 (M); *J. Skehan*, Ocean Springs, May 8, 1895 (M) and no. 62. GEORGIA: *Mrs. Say* (?), Savannah (P).

Var. HISPIDA Benth. A slender form, reddish in color when dried, stem and leaves distinctly pilose: the leaves thin: the crenate basal ones, when present, not exceeding the upper cauline leaves.—Lab. 435 (1832–1836).—Florida to Arkansas and Texas on moist sandy ground. The following are characteristic. FLORIDA: *A. H. Curtiss*, no. 6645 (M); *S. M. Tracy*, no. 9162 (M), (M) no. 109080. GEORGIA: *H. Eggert*, DeKalb Co., July 24, 1897; (M) no. 788487. LOUISIANA: *J. Hale*, Alexandria (P); *E. J. Palmer*, no. 7604 (M); *C. R. Ball*, no. 517; *J. F. Joor*, Madisonville, May 4, 1888 (M); *T. Drummond*, no. 248. TEXAS: *J. Reverchon*, no. 2127 (M); *E. Hall*, no. 455. ARKANSAS: *E. J. Palmer*, no. 10522 (M), *H. Eggert*, Jefferson Co., June 8, 1898 (M).

Var. **MULTIGLANDULOSA** Kearney. A short-stemmed leafy form, never exceeding 2.5 dm.; puberulent or pilose on the leaf-nerves and margins and on the stem: leaves oblong-ovate or spatulate, slightly, if at all petioled, entire, revolute-margined; occasionally 1-3 pairs of small, dentate petioled basal leaves, but these always shorter than the upper: flowers in the upper axils, the inflorescence appearing scarcely racemose: corolla as in the species.—Bull. Torr. Bot. Club, xxi. 482 (1894).—Pine barrens or dry open ground, Georgia and Florida to Louisiana. The following are characteristic. FLORIDA: *A. S. Hitchcock*, Suwanee Co., June-July, 1898 (M), and no. 477 (M); *C. S. Williamson*, Palatka, April, 1897 (P); *Dr. Leavenworth*, Fort King (P). GEORGIA: *R. M. Harper*, no. 822. ALABAMA: *Gates & Jewett*, Mobile. LOUISIANA: *E. J. Palmer*, no. 7959 (M).

Var. **glabriuscula** (Fernald), n. comb. Much like the variety *hispidula*: slender, 2-5 dm. high, simple or branched, very slightly pubescent or glabrous: inflorescence racemose: leaves on distinct petioles, practically glabrous; the lower sometimes dentate: corolla subglabrous.—*S. glabriuscula* Fernald, Bot. Gaz. xxxiii. 156 (1902). "*S. hyssopifolia* L." on many herbarium sheets, *nomen dubium*.—Mostly on sandy pine lands, Georgia and Florida to Mississippi. The following serve to represent the variety. GEORGIA: *R. M. Harper*, no. 885. FLORIDA: *A. H. Curtiss*, nos. 6097, 3, and 13425 (M); *G. V. Nash*, no. 2277. ALABAMA: *H. Eggert*, Cullman, June 18, 1897 (M); *F. S. Earle & C. F. Baker*, Evergreen, June 6, 1897 (M). MISSISSIPPI: *J. Skehan*, no. 22603; *S. M. Tracy*, no. 4900.

Var. **floridana** (Chapm.), n. comb. A very slender linear-leaved form, minutely pubescent: lips of the corolla very broad.—*S. floridana* Chapm. Fl. So. U. S. 324 (1860).—Probably confined to the pine barren swamps near Apalachicola in western coastal Florida. The following are representative. (M) nos. 788588 (Apalachicola), 108997 (*D. U. Dean*), 108999, 109000 (Herb. Chapm.); *A. W. Chapman*, no. 13207 (M), and Apalachicola (ex. Herb. J. Carey).

17. *S. BUSHII* Britton. FIG. 15. Erect, mostly caespitose in habit; stems simple, whitish-pubescent or puberulent, 1.5-3.5 dm. high: leaves entire, oblanceolate, obtuse, sessile: nutlets with more wart-like, less rosulate papillae: otherwise as in *S. integrifolia* var. *multiglandulosa* to which it is nearest related.—Man. 785 (1901).—Rocky barrens or hillsides in Carter and Shannon Counties, MISSOURI. The following are representative: *B. F. Bush*, nos. 49 (M), 189, 378, 7817 (M), 461 (M), 48 (M), 4737 (M); *E. J. Palmer*, no. 19496.

18. *S. CANESCENS* Nutt. FIG. 14. Erect, tall, much branched at the top, canescent throughout except the upper surface of the leaves, 3-12 dm. high: leaves ovate-lanceolate, acute to cordate at the base, crenate, usually glabrous above, 5-12 cm. long, on petioles 1.5-4 cm. long: inflorescence mostly paniced: corolla 18-25 mm. long; upper lip very much arched over the shorter lower one: nutlets with truncate papillae, brownish, close to those of *S. serrata* but smaller and with blunter papillae.—Gen. ii. 38 (1818). *S. incana* Muhl. Cat.

56 (1813), *nomen subnudum*.—Dry woods, river-banks, etc., Pennsylvania to Wisconsin and south to Arkansas and Georgia. The following represent the plant and its range. PENNSYLVANIA: *O. E. Jennings*, Glenshaw, August 3, 1918; *T. C. Porter*, Huntingdon Co. INDIANA: *C. C. Deam*, no. 5183. ILLINOIS: *H. A. Gleason*, no. 2617. WISCONSIN: *T. J. Hale*, Lake Pepin, 1861. KANSAS: *A. S. Hitchcock*, no. 797. MISSOURI: *B. F. Bush*, no. 6113; *E. E. Sherff*, no. 635. ARKANSAS: *F. L. Harvey*, no. 109. TENNESSEE: *S. M. Bain*, no. 323. KENTUCKY: *C. W. Short*, 1840 (M). WEST VIRGINIA: *W. M. Pollock*, Upshur Co., July 8, 1895 (M). NORTH CAROLINA: *T. G. Harbison*, Waynesville, May 30, 1897. GEORGIA: *R. M. Harper*, no. 1368.

Var. **PUNCTATA** Chapm. Like above but with foliage glabrate and densely punctate.—Fl. So. U. S. 323 (1860).—North Carolina, Georgia and Florida. The following are characteristic. NORTH CAROLINA: *J. D. Smith*, August 7, 1882, *C. S. Williamson*, Balsam, July, 1897. GEORGIA: *J. K. Small*, Rabun Co., August 11, 1893; *C. S. Williamson*, Atlanta, August, 1896. FLORIDA: *G. V. Nash*, Bellair, September 3, 1895, (M) nos. 108778 and 108875.

19. *S. SERRATA* Andr. FIG. 13. Stem erect, 2.5–6 dm. high, nearly always simple, with from 3–5 pairs of leaves: leaves thin, mostly glabrous, ovate, acuminate at both ends or rounded at the base, serrate or crenate, 2.5–10 cm. long, on slender petioles 2.5 cm. or less long; the lower pairs smaller; the floral leaves abruptly reduced and becoming entire: inflorescence with rare exceptions a simple terminal raceme: corolla violet-blue, 2–3 cm. long; the lower lip nearly equalling the upper, sometimes appearing longer by protrusion at right angles from the tube: nutlets dark brown, about 2 mm. in diameter, with obtusely pointed papillae.—Bot. Rep. t. 494 (1808). *S. laevigata* Aiken in Eaton, Man. ed. 6: 333 (1833).—Woods and damp habitats, Pennsylvania to Missouri and North Carolina. The following represent the plant and its range. PENNSYLVANIA: *G. W. Smith*, Delaware Co., June 23,—(P); *J. Pennell*, no. 2713 (P); *E. B. Bartram*, Darby Creek, July 21, 1907 (P); *U. C. Smith*, no. 1177 (P). MARYLAND: *J. D. Smith*, Patapsco Valley, Howard Co., May 25, 1881; *J. J. Carter*, Conowingo, June 1, 1906. DISTRICT OF COLUMBIA: *E. S. Steele*, Washington, May 19, 1896; *T. Morong*, May 21, 1877 (M). WEST VIRGINIA: *F. W. Hunnewell*, July 4–6, 1914. VIRGINIA: *S. B. Buckley*, June, 1838 (M); *A. H. Curtiss*, Bedford Co., June 6, 1872 (M); *H. D. House*, no. 858 (M). NORTH CAROLINA: *W. W. Ashe*, no. 6445; *Biltmore Herbarium*, Biltmore, no. 1250b. TENNESSEE: *A. Ruth*, no. 116. ILLINOIS: ex. Herb. *G. Thurber*. MISSOURI: Pilot Knob, June 17, 188-.

Var. **montana** (Chapm.), n. comb. Similar to above, but stems and leaves glandular-pubescent; occasionally the upper leaves nearly hastate or very simply serrate: corolla bluish, strongly ampliate upward, 3 cm. or slightly more in length.—*S. montana* Chapm., Bot. Gaz. iii. 11 (1878). Inc. *S. Mellichampii* Small, Fl. 1022 (1903).—

In the mountains of northern Georgia, western North Carolina, South Carolina, southern Tennessee, and northern Alabama. The following are representative. SOUTH CAROLINA: *Mellichamp*, no. 14 (M), and Bluffton, 1872 (M). GEORGIA: *A. W. Chapman*, Rome (M); (M) nos. 109124, 109125, 788591 and 109485. NORTH CAROLINA: *T. G. Harbison*, Highlands, July 20, 1904. TENNESSEE: *J. R. Churchill*, Chattanooga, May 21, 1911; *J. F. James*, Spring City, June 11, 1883. ALABAMA: *H. Eggert*, Springville, July 7, 1898; *S. Watson*, Queensboro, 1857.

20. *S. VERSICOLOR* Nutt. FIG. 9. Erect, glandular-hairy, especially in the inflorescence, which is commonly branched, 2–8 dm. high: leaves broad, cordate, rugose, crenate, 3–12 cm. long, long-petioled: corolla 1.7–2.5 cm. long, slender up to the throat, ampliate at the lips, blue to purple at the limb, but whitish on the tube: nutlets buff to orange in color, the processes tuberculate-conical.—Gen. ii. 38 (1818). ? *S. cordifolia* Muhl., Cat. 56 (1813), *nomen subnudum*. *S. cordifolia* var. *pilosissima* Mack. & Bush, Trans. Acad. Sci. St. Louis, xii. 84 (1902), in part.—Wisconsin and Iowa to Louisiana and eastward to North Carolina. The following are representative. WISCONSIN: *T. J. Hale*, Maiden Rock, 1861 (M); *Lapham* (P). IOWA: *A. S. Hitchcock*, Iowa City, 1888; *C. R. Ball*, no. 1588 (M). ILLINOIS: *F. C. Gates*, no. 10828 (M); *O. E. Lansing*, no. 62; *H. C. Skeels*, no. 388; *E. E. Sherff*, no. 320; *H. A. Gleason*, no. 1842. MISSOURI: *B. F. Bush*, nos. 5851, 725 (M). ARKANSAS: no. 5912 (M). LOUISIANA: *Dr. Carpenter*, Jackson, June; *E. J. Palmer*, no. 7601. MISSISSIPPI: *S. M. Tracy*, no. 4896. KENTUCKY: *S. F. Price*, Bowling Green. TENNESSEE: *E. J. Palmer*, no. 17640 (M). OHIO: *E. L. Moseley*, Margaretta, June 6, 1895. VIRGINIA: *A. H. Curtiss*, Peaks of Otter, August 6, 1871. MARYLAND: *W. E. A. Aikin*, Harper's Ferry. NORTH CAROLINA: *R. Thaxter*, Cullowhee, June 15–July 15, 1887; *C. S. Williamson*, Weldon, August, 1892 (P). Grades gradually into

Var. *BRACTEATA* Benth. This form as found in TEXAS is very distinct, with floral bracts showy and much exceeding the combined length of pedicel and calyx. The leaves of the stem gradually merge into the bracts.—Lab. Gen. et Sp. 433 (1832–1836). *S. cordifolia* var. *pilosissima* Mack. & Bush, Trans. Acad. Sci. St. Louis, xii. 84 (1902), in part. *Lindheimer's* no. 492, *J. Reverchon's* nos. 769 and 253, and *C. Wright's* no. 476 are typical. It is probable also that certain plants from Arkansas and Missouri should be referred here, but one hardly knows where to stop.

Var. *MINOR* Chapm. Very similar to typical *S. versicolor*, having its diminutive size but with much smaller ovate, rugose leaves.—Fl. So. U. S. 323 (1860). *S. rugosa* Wood, Cl. Bk. 246 (1848).¹

In his earliest description Chapman allocates this form to the “dry woods near Washington, Wilkes County, Ga.,” and later he merely states “upper districts.” The plants which seem most logi-

¹ In later editions of his Class Book, Wood reduces his *S. rugosa* to *S. saxatilis*.

cally to be referred to this category occur rather scatteringly on the southern edge of the range of *S. versicolor*, and some of the specimens are not distantly related to *S. saxatilis*. However, Chapman had a different plant in mind. The following are taken as representatives. MISSOURI: *W. Trelease*, no. 721 (M); *B. F. Bush*, no. 791 (M); *K. K. Mackenzie*, Eagle Rock, September 23, 1896 (M). ARKANSAS: *E. J. Palmer*, no. 4750 (M). A plant collected at Harper's Ferry, and answering to the description of *S. rugosa*, collected at the same place, is also included here.

21. *S. SAXATILIS* Riddell. Erect, or somewhat assurgent and weak, glabrous or somewhat hairy, 1–5 dm. long: leaves thin, with few spreading hairs on the upper surface, obovate or cordate, obtuse, long-petioled; the upper crenate-serrate; bracts entire: corolla about 2 cm. long, slender; the upper lip not arched, nearly as in *S. versicolor*: nutlets resembling those of *S. versicolor*, but the protuberances somewhat longer and more acute.—Supp. Cat. Ohio Pl. 14 (1836).—Rocky woodlands from Pennsylvania to Kentucky and Tennessee. PENNSYLVANIA: *J. A. Schafer*, Jacobs Creek, Westmoreland County, July 20, 1900 (P); *C. S. Williamson*, Ohio Pyle, August 31, 1905. NEW JERSEY: *C. F. Parker*, no. 6619 (M). DELAWARE: *E. Tatnall*, Wilmington, September 8, 1858. DISTRICT OF COLUMBIA: *W. R. Maxon*, no. 6242. OHIO: *H. N. Mertz*, Steubenville, June 5, 1880 (P). WEST VIRGINIA: *Mr. & Mrs. E. S. Steele*, no. 31 (M). KENTUCKY: *C. W. Short*, no. 2 (P). TENNESSEE: *A. Ruth*, no. 545 (M); *A. H. Curtiss*, no. 2054.

Var. **arguta** (Buckley), n. comb. This is doubtfully given rank as a variety of the above. It is small, assurgent, with ovate, sharply dentate leaves scatteringly pilose, and is confined to the mountains of North Carolina and Tennessee.—*S. arguta* Buckley, Am. Journ. Sci. xlv. 170, 177 (1843).—The following represent the plant. NORTH CAROLINA: *Biltmore Herbarium* (G), no. 7171; TENNESSEE: *A. Ruth*, no. 119, 8.

COLORADO COLLEGE,

Colorado Springs, Colorado.

EXPLANATION OF PLATES 140 AND 141.

Nutlets of *Scutellaria*, about $\times 25$. Fig. 1, *S. nervosa*; fig. 2, *S. parvula*; fig. 3, *S. angustifolia*; fig. 4, *S. antirrhinoides*; fig. 5, *S. nana*; fig. 6, *S. epilobifolia*; fig. 7, *S. lateriflora*; fig. 8, *S. resinosa*; fig. 9, *S. versicolor*; fig. 10, *S. integrifolia*; fig. 11, *S. Drummondii*; fig. 12, *S. tuberosa*; fig. 13, *S. serrata*; fig. 14, *S. canescens*; fig. 15, *S. Bushii*.